ARCADIAN

Volume 2, Number 10 Sept.17, 1980

THIS FAT ISSUE is the last for the 1980 fiscal year. The next issue, November, will be the first of Volume Three. Again, we've had a number of issues over and above the guaranteed minimum of 6 per year, and actually more pages than last year's volume. The main reason to stop at this point is to allow my wife and myself the luxury of a month's vacation to celebrate our twenty-fifth anniversary. Hopefully, the extra material in this issue will tide you over until we return and have the opportunity to prepare the next issue from all the material you will have continued to send in. While we will have a house-sitter, there won't be anyone around to do anything about telephone calls. Mail will be picked up by one of the local elves, if an "A" or "ARCADIAN" appears on the envelope.

SINCE this is the end of Volume Two, it follows that subscriptions for Volume Three are now due. I'll continue the guarantee of at least 6 issues, as I have in the past. There were 5 'extras' in Volume One and 4 in Volume Two under that scheme. The rate for the next Volume will be $12.50, partly in anticipation of a postal increase rumored for November, partly to worry about the proposed 9-digit Zip Code we may have to reprogram the address list for, and partly to allow for some increase in productivity in preparing and distributing the paper. For example, it takes 2 hours of work per 100 copies, between receipt from the printer and delivery to the post office. I'd like to decrease that labor cost and mechanize the operation a little more, but that costs money. Recall that this is a part-time hobby operation, and there are other things that call upon my time.

AN INCREASE in the number of subscribers would be a more palatable way to increase revenues, so why don't you make it a personal goal to induce a Bally buddy to have his own subscription, and I'll consider a rate reduction... Each of the little projects and publications is priced to stand alone, but a peculiarly large amount of money is consumed by the little nickle and dime (quarter and half?) things like extra postage, telephone, gas to the printer, lost mail, etc., that in the aggregate become a considerable sum.

USER GROUPS are encouraged, for when a couple of owners can get together, more is accomplished than when working alone - mutual assistance, etc. We've identified a couple of these in past issues and would like more to be developed, especially as we get into more complicated subjects. To further this concept, I'll send additional copies of the ARCADIAN to the same address at a reduced rate - three or more copies to one address at $8.50 per subscription.

WHEN SENDING your subscriptions for next year, it would make things easier if you would put an "S" on the envelope and we can channel those into the right pile to get the next year's address labels made up as soon as possible.

```
MORSE CODE (ENHANCED & CORRECTED)
  10 :RETURN ;CLEAR ;NT=1
  20 BC=RND (32)b8;FC=BC+4+RND (32)b8
  30 PRINT ;PRINT "    MORSE CODE
  40 PRINT ;INPUT "  SPEED?"D
  45 PRINT ;PRINT "TYPE WORDS RUN FOR CODE
  50 PRINT ;PRINT "YOUR MESSAGE:
  60 PRINT ;B=0
  70 B=B+1;N=KP;IF N=106GOTO 200
  80 @(B)=N;TV=N;(F N=31B=B-2
  90 GOTO 70
 200 CLEAR ;FC=0;BC=3;P=0;CY=40;FOR A=1TO B-1
 210 P=P+1;IF P=10P=0;CY=40
 220 N=@(A);NT=0;TV=N;PRINT " ",;NT=D
 230 IF N<44GOTO 300
 240 IF N>90GOTO 300
 250 IF N=47GOTO 300
 260 IF N>57IF N<65GOTO 300
 270 GOSUB Nb10
 275 FOR C=1TO 25bD;NEXT C
 280 NEXT A
 290 GOTO 1000
 300 TV=31;PRINT ;FOR C=1TO 25bD;NEXT C
 310 GOTO 280
```

MORSE CODE MODIFICATION by Bob Weber adds a little enhancement by adding a question at the end - press PRINT to repeat the message, press ERASE to start a new one, & press + to add to the message.

Utilize lines 440 through 1000 as written, with the two corrections added below.

```
1005 CLEAR
1010 B=B-1;NT=0;FOR C=1TO B
1020 TV=@(C);NEXT C;PRINT
1030 PRINT "END OF MESSAGE
1040 IF &(20)=16B=B+1;GOTO 200
1050 IF &(21)=16RUN
1060 IF &(20)=8B=B+1;@(B)=32;PRINT "INPUT ";GOTO 70
1070 GOTO 1040
```

Bob Weber
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Algonac, MI 48001

There were two errors in the listing on p.81:
change 660 to read PRINT"QØØ Q Q Q"; RETURN
change 460 to read PRINT"Q QØØ Q QØØ Q QØØ";RETURN

SALVAGE BOARD CHECKOUT described on p. 80 has a partial error in table 2. I identified chip U14 and pin 16; but it should have been chip U14 and pin 6, as was mentioned in the text.

YAHTZEE ADDITION CORRECTION. The modification presented on p.82 made the dice nice and big, but I made two errors, in lines 380 and 385. Change the first command in each to have a > instead of =, so they read:

```
380 IF Z>1 ...
385 IF Z>3 ...
```

ATTACK MODIFICATION REBUTTAL Carl Morimoto, author of ATTACK, indicates that the modification I presented on p. 67 will cause the piece to move in two-square increments, which is not the intent. Pieces must stay within the wall constraints.

BASE CONVERSION by Ron McCoy puts it all together. Now you can have one program that will convert from any of the numerical systems into the other four, rather than have to use individual programs. If you start with decimal, the program takes the whole number in one piece and converts it. If you start with any of the other four, you have to enter each digit; as with Hex- to enter 23AC, enter 2 GO 3 GO A GO C GO and thats it.

Ron McCoy
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Minneapolis, MN 55444

```
  1 .BASE C0NVERSI0N
  2 . R0N MCC0Y
  3 .  MAY 30, 1979
  4 .SZ=385
  5 :RETURN
 10 CLEAR
 20 PRINT "INPUT KNOWN BASE
 30 PRINT "   B,D,H 0R O";PRINT
 40 P=KP;IF (P="B")+(P="D")+(P="H")+(P="O")GOTO 60
 50 PRINT "*INVALID-TRY AGAIN*";GOTO 240
 60 IF P="D"INPUT "INPUT #"S;GOTO 240
 70 PRINT "INPUT (W/ LEADING 0'S
 90 IF P="O"GOTO 180
100 IF P="B"GOTO 510
109 .HEX TO DECIMAL
110 A=10;B=11;C=12;D=13;E=14;F=15
120 PRINT "4 DIGIT HEX #
130 INPUT W,X,Y,Z
140 IF (W>7)+(X>15)+(Y>15)+(Z>15)PRINT "T00 BIG";GOTO 120
150 S=(4096bW)+(256bX)+(16bY)+Z
160 GOTO 220
179 .0CTAL TO DECIMAL
180 PRINT "5 DIGIT 0CTAL #
190 INPUT V,W,X,Y,Z
200 IF (V>7)+(W>7)+(Y>7)+(Z>7)PRINT "T00 BIG";GOTO 180
210 S=(4096bV)+(512bW)+(64bX)+(8bY)+Z
220 PRINT ;PRINT #1,S," DECIMAL
239 .BINARY TO DECIMAL
240 Q=Sc2
250 O=RM
260 FOR R=311TO 324
270 Q=Qc2
280 GOSUB R
290 NEXT R
300 GOTO 330
311 N=RM
312 M=RM
313 L=RM
314 K=RM
315 J=RM
316 I=RM
317 H=RM
318 G=RM
319 F=RM
320 E=RM
321 D=RM
322 C=RM
323 B=RM
324 A=RM;RETURN
330 PRINT #1,A,B,C," ",D,E,F,G," ",H,I,J,K," ",L,M,N,O," BINARY
339 .BINARY TO HEX
340 Z=O+(2bN)+(4bM)+(8bL);IF Z>9Z=Z+7
350 Z=Z+48
360 Y=K+(2bJ)+(4bI)+(8bH);IF Y>9Y=Y+7
370 Y=Y+48
380 X=G+(2bF)+(4bE)+(8bD);IF X>9X=X+7
390 X=X+48
400 W=C+(2bB)+(4bA)
410 W=W+48
419 .BINARY TO 0CTAL
420 V=O+(2bN)+(4bM)
430 U=L+(2bK)+(4bJ)
440 T=I+(2bH)+(4bG)
450 S=F+(2bE)+(4bD)
460 R=C+(2bB)+(4bA)
480 TV=W;TV=X;TV=Y;TV=Z;PRINT " HEX
490 PRINT #1,R,S,T,U,V," 0CTAL
500 PRINT ;GOTO 20
509 PRINT "T00 BIG
510 PRINT "15 DIGIT BINARY #
520 INPUT A,B,C,D,E,F,G,H,I,J,K,L,M,N,O
530 IF (A>1)+(B>1)+(C>1)+(D>1)+(E>1)+(F>1)+(G>1)+(H>1)+(I>1)+
    (J>1)+(K>1)+(L>1)+(M>1)+(N>1)+(O>1)GOTO 509
540 S=(16384bA)+(8192bB)+(4096bC)+(2048bD)+(1024bE)+(512bF)+
    (256bG)+(128bH)+(64 bI)+(32bJ)+(16bK)+(8bL)
550 S=S+(4bM)+(2bN)+O
560 GOTO 220
```

BALLY WAS SPOTLIGHTED during Personal Computing 80, the fifth annual personal computing and small business computer show, held in Philadelphia on August 21-24. The "largest personal computing show in 1980" devoted 2½ hours during the Visual Arts Festival held on Sunday and sponsored by the Philadelphia Area Computer Society, to the Bally Home Computer System. The topic, "Low Cost Pixel Art" was presented by Zuszsanna Molnar and Frank Dietrich of Chicago Circle, University of Illinois and Professor Lou Katz and Jinko Gotoh of Columbia University. Discussions supported by video tape included interactive programs for graphics, real time animation, and the new Bally ZGRASS System. The marketing tape on the ZGRASS system ($2800 with monitor) was quite impressive: four times the video resolution of the current Bally Arcade, 64K of memory, floating-point arithmetic with trig functions, and other great features. Topping the show off with a visit to the Bally Park Place Casino in nearby Atlantic City made it a memorable weekend - (No winnings to report!)

(above report direct from Karen Phelps Cravedi of the Tidewater Computer Club - I can use more ready-to-print material, thanks Karen)

PROGRAMMING HINTS listed below were extracted from an article by Steve Kimmel in the August Creative Computing (p.64) are are submitted as guides for the types of programs to write:

- o Don't write the program if you are going to do the job only once or twice a year.
- o Don't write a program if a human could do the job in less than 5 minutes.
- o Don't write a program if you could do it better with a calendar and pencil, file boxes and cards, or a calculator.
- o Don't write a program if you don't need the accuracy.

TOUCHTONE modification by Rich Tietjens, now settling down at Monterey ,CA for a few months.

```
 65 IF ((N 47)+(N 58))-((N 64)+(N 69))-(N=42)-(N=35) GOTO 7Ø
 67 GOTO 3Ø
287 C=119; R=188; RETURN
294 C=146; R=188; RETURN
317 C=109; R=253; RETURN
318 C=109; R=230; RETURN
319 C=109; R=208; RETURN
320 C=109; R=188; RETURN
```

BOTS program by Ron McCoy is a challenge. Modified from a program in the June 1979 Personal Computing, it sets up a 9x19 grid on the screen. Fifteen "walls" are randomly placed in the squares, and the 15 "bots"(*) are also randomly placed. Then your position is similarly located. Hand controller 1 is used to move the target (you) in any of the eight available directions, or stand still, and the trigger makes it happen. (The knob is used to turn a little indicator to the desired direction.) After you make your move, all the bots start to advance upon you, one square at a time, each. If they hit a wall, they disappear. The object is to wipe them out, but it is a difficult job. You have to maneuver yourself so that the bots keep hitting walls. I kept saying 'next time I'll get them', to no avail.

```
  1 .
  2 .
  3 .
  4 .BOTS
  5 .BY RON MCCOY
  6 :RETURN
 10 CLEAR ;BC=0;FC=142;R=15
 12 PRINT "BØTS ARE *’. I’S ARE
 14 PRINT "WALLS. BØTS MØVE AT YØU,
 16 PRINT "BUT DIE IF THEY HIT A
 18 PRINT "WALL. KNØB PØINTS WAY,
 20 D=600;I=650;L=700
 22 PRINT "TRIGGER MAKES MØVE.
 24 FOR A=1TO 999;NEXT A
 30 C=0;V=1;N=0;CLEAR
 40 FOR Y=-32TO 40STEP 8
 50 FOR X=-70TO 63STEP 7
 60 C=C+1;@(C)=0;BOX X,Y,6,7,1
 70 NEXT X
 80 NEXT Y
 90 FOR A=1TO R
100 GOSUB D
110 GOSUB I
120 IF @(C)#0GOTO 100
130 CX=0;CY=P;TV=73;@(C)=73
140 NEXT A
150 FOR A=1TO R
160 GOSUB D
170 GOSUB I
180 IF @(C)#0GOTO 160
190 CX=0;CY=P;TV=42;@(C)=1
200 NEXT A
210 GOSUB D
220 GOSUB I
230 IF @(C)#0GOTO 210
240 FOR B=1TO 750
250 BOX O,P,7,7,2;LINE O,P,4;BOX O,P,2,2,1
260 Q=(KN(1)+127)c28
270 IF Q=1LINE O,P+3,1;M=20
280 IF Q=2LINE O+3,P+3,1;M=21
290 IF Q=3LINE O+3,P,1;M=1
300 IF Q=4LINE O+3,P-3,1;M=-19
310 IF Q=5LINE O,P-3,1;M=-20
320 IF Q=6LINE O-3,P-3,1;M=-21
330 IF Q=7LINE O-3,P,1;M=-1
340 IF Q=8LINE O-3,P+3,1;M=19
350 IF (Q<1)+(Q>8)M=0
360 IF TR(1)BOX O,P,7,7,2;BOX O,P,6,7,1;GOTO 400
370 NEXT B
380 FC=0;IF TR(1)FC=142;GOTO 240
390 GOTO 380
400 @(C)=0;M=M+C;C=M
410 GOSUB L
420 CX=0;CY=P;TV=43;@(M)=43
430 J=0;K=P;V=0;N=N+1
440 FOR A=1TO 200
450 IF @(A)=N C=A;GOSUB 800
```

```
460 NEXT A
470 IF V=1C=M;GOSUB L;GOTO 240
480 GOSUB 750;R=R+1
490 PRINT "HØT DAMN! YØU WØN!
500 GOTO 530
510 GOSUB 750;R=R-2
520 PRINT "DRAT!
530 PRINT "WANNA RERUN?
540 PRINT #1,"IT’LL BE ",R," BØTS
550 PRINT "1=YES
560 A=KP
570 IF A="1"GOTO 30
580 STOP
600 X=RND (20)b7-77
610 Y=RND (10)b8-40
620 O=X;P=Y;RETURN
650 T=20b(Y+32)c8
660 S=(X+77)c7
670 C=S+T;RETURN
700 P=(200-C)c20+1;P=11-P
710 O=C-(20bP)+20
720 P=8bP-40;O=7bO-77
730 X=O;Y=P;RETURN
750 CX=-70;CY=CY-16;RETURN
800 GOSUB L
820 IF O>J X=X-7
830 IF O<J X=X+7
840 IF P>K Y=Y-8
850 IF P<K Y=Y+8
```

```
860 G=X;H=Y
870 GOSUB I
880 IF @(C)=43CX=G;CY=H;TV=79;GOTO 510
890 IF @(C)=73BOX O,P,6,7,1;@(A)=0;RETURN
900 V=1;@(C)=N+1;CX=G;CY=H;TV=42;
    BOX O,P,6,7,1;RETURN
```

```
  1 .COUNT THE DOTS
  2 .(C) 1980 L. & M. PORTER
  5 NT=0
  7 H=0;I=0;E=0;O=0
 10 G=0;L=0
 20 R=0;M=0;Q=0;W=0
 30 P=0;B=0;C=0;N=0
 40 CLEAR ;PRINT "INPUT # OF ROUNDS OF COUNTING ?";INPUT X
 44 IF X<1GOTO 40
 45 IF X>54NT=3
 46 IF X>54PRINT "SMALLER # OF ROUNDS ";PRINT "PLEASE!";NT=0;GOTO 40
 50 CLEAR ;PRINT "INPUT DIFFICULTY";PRINT ;PRINT "1-HARD  TO  500-EASY";INPUT D

 60 IF D>500GOTO 50
 70 IF D<1GOTO 50
 80 CLEAR ;BC=249;FC=7
 90 FOR A=1TO RND (17)
100 BOX RND (50)-25,RND (44)-22,1,1,1
110 NEXT A
120 FOR Z=1TO D
130 IF TR(1)=1GOTO 150
140 NEXT Z
150 CLEAR ;PRINT Z
155 IF Z=1NT=5;PRINT "DON'T CHEAT BY HOLDING ";PRINT "THE TRIGGER IN";PRINT "NO
W, GET READY    GO!";NT=0;GOTO 80
160 PRINT "YOUR COUNT?";INPUT K
170 Q=Q+Z
175 IF K=A-1 I=I+Z
177 IF K#A-1 W=W+Z
190 IF K=(A-1)PRINT "RIGHT!";IF K=(A-1) B=B+1
202 IF K=A-1 IF A-1>=9 P=ABS(8-(A-1))
205 IF K=A-1 IF A-1<9 P=0
207 IF A-1>=9 E=E+1
208 IF K=A-1 H=H+P
210 IF K=(A-1)G=G+(A-1)
230 IF K#(A-1)BC=93;PRINT "SORRY PAL";IF K#(A-1) C=C+1
240 PRINT "DOTS ",#1,A-1
250 PRINT "RIGHT ",#1,B
260 PRINT "WRONG ",#1,C
270 FOR J=1TO 500
280 NEXT J
285 BC=249
290 N=N+1
300 M=M+(A-1)
310 R=R+K
320 IF N=XPRINT "GAME OVER
325 O=600-D
330 L=(600-D)bX
340 V=LcQ
350 F=(Eb(Vc10)+E+B+H+G+(((ObB)-I)c10))c10
```

```
 360 IF N=XPRINT "CORRECT COUNT=",#1,G
 390 IF N=XPRINT "ADJSTD DFCLTY FCTR=",#1,V,#1,".",(RMb10)cQ
 400 IF N=XPRINT "TOTAL/INPUT ",#1,M,"/",#1,R
 420 IF N=XPRINT "TIME/USED ",#1,(D+1)bX,#1,"/",#1,Q
 425 IF N=XIF B+G+E+H<25GOTO 465
 430 IF N=XPRINT "REACT TIME/CRRCT RND=",#1,IcB
 440 IF N=XPRINT "AVG REACTION TIME/RND=",#1,(W+I)cX
 450 IF N=XPRINT "ALOTD/USED ",#1,((D+1)bX)cM,#1,".",(RMb10)cM,"/",#1,QcM,#1,"."
,(RMb10)cM
 451 IF N=XPRINT "USED/CORRECT DOTS=",#1,QcG,#1,".",(RMb10)cG
 452 IF N=XPRINT "FOR HARD RNDS=",#1,Qc(H+(9bE)),#1,".",(RMb10)c(H+(9bE))
 460 IF N=XPRINT "# OF HARD RDS=",#1,E," ABS=",#1,EbB+H+G+(((ObB)-I)c10)
 465 IF N=X IF X<10PRINT "10 RDS + FOR PRAC. SCORE; TRY AGAIN";GOTO 480
 470 IF N=XPRINT "PRAC. SCORE=",#1,F
 472 IF F>T T=F
 473 IF N=XPRINT "HI SCORE=",#1,T
 480 IF N=XINPUT "SAME=1  NEW=2"U
 490 IF N=X IF U=1 H=0;I=0;E=0;O=0;G=0;L=0;R=0;M=0;Q=0;W=0;P=0;B=0;C=0;N=0;D=D;X
=X;GOTO 60
 500 IF N=XIF U=2GOTO 5
 510 GOTO 60
>
```

COUNT THE DOTS program puts up a random number of dots on the screen (max 17) for a short period of time, and as soon as you've counted them, you pull the trigger to stop the clock, and enter the amount in the keypad. The computer will keep track of the score. "DIFFICULTY" sets the timing. By changing the X and Y valu , you change the size of the playing field. On the surface, this seems to be just a simple game, but if we look a little deeper, we can see an application in the field of ophthalmology - checking field of view of one's eye, blind spot size, etc., and other ideas having to do with perception can be developed.

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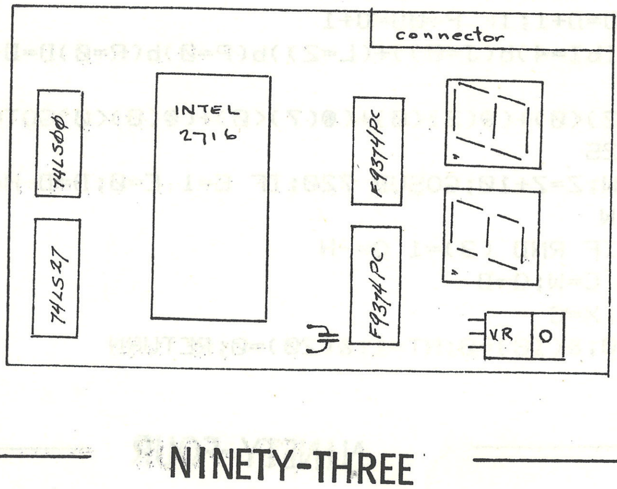
BALCHECK For those of you technical types that obtained the material offerred in the last issue, here is a parts layout of the pc board as was produced by Bally:



Bob Wiseman
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Cincinnati. OH 45245

```
  5 .CONNECT FOUR
  6 .BY BOB WISEMAN
 10 GOSUB 900
 20 A=1;GOSUB 200;GOSUB 700
 30 IF EGOTO 100
 40 A=2;IF B=1GOSUB 500
 50 IF B=2GOSUB 200
 60 GOSUB 700;IF EGOTO 100
 70 GOTO 20
100 GOSUB 800;GOTO 10
200 CX=-77;CY=40
205 PRINT "PLAYER",#2,A,"-ENTER COLUMN ",
210 K=KP;TV=K;X=10bK-520
220 Y=20;GOSUB 975
225 IF I#0MU=70;MU=49;GOTO 205
250 RETURN
500 H=30000;Q=-H;C=0;CX=-77;CY=40
501 NT=0;&(21)=15;&(22)=-1;R=0
503 PRINT "NOW I WILL FIND A MOVE ",
505 FOR X=-30TO 30STEP 10;Y=-30;R=0
510 GOSUB 975;IF I>0Y=Y+10;GOTO 510
515 IF I<0GOTO 660
520 D=4-ABS(XbY)c100;W=X;Z=Y;K=0
525 FOR L=-1TO 1;FOR M=-1TO 1
526 &(16)=X+30;&(17)=20bL+20;&(18)=Mb30+30
530 X=W;Y=Z;IF L=0IF M=0GOTO 570
535 F=3;K=K+1;P=0
537 &(19)=Kb15
540 X=X+10bL;Y=Y+10bM;GOSUB 975
545 IF F=3F=I
550 IF I<1GOTO 565
560 IF I=F P=P+2bI-3;GOTO 540
565 R=R+ABS(P);@(K)=P;@(K+8)=I
570 NEXT M;NEXT L
572 IF R=0GOTO 625
575 FOR M=1TO 8;I=@(M);J=@(9-M)
576 &(19)=Mb17
580 L=J+I;P=@(M+8);R=@(17-M)
585 IF (L=3)+(I=3)D=H
590 IF (L=-3)+(I=-3)D=D+500
595 IF I>0D=D+1;IF P=0D=D+1
597 IF I#0D=D+1;IF P=0D=D+1
600 IF (((IbI=4)b(J=0))+(L=2))b(P=0)b(R=0)D=D+100
610 NEXT M
615 IF (@(2)<0)+(@(3)<0)+(@(7)<0)+(@(8)<0)GOTO 620
618 GOTO 625
620 A=1;X=W;Z=Z+10;GOSUB 720;IF E=1 E=0;D=D-Hc10
625 A=2;X=W
630 IF D=QIF RND (3)=1 Q=-H
635 IF D>Q C=W;Q=D
660 NEXT X;X=C
665 &(19)=0;&(18)=0;NT=1;&(20)=0;RETURN
```

cont. on
p. 95

connect 4
(con't)

```
700 Y=20;W=X
705 Z=Y;I=A;GOSUB 950
710 Y=Y-10;GOSUB 975;IF I#0GOTO 720
715 Y=Z;GOSUB 950;Y=Y-10;GOTO 705
720 K=0;FOR L=-1TO 1
725 FOR M=-1TO 1;IF M=0IF L=0GOTO 750
730 K=K+1;X=W;Y=Z;P=0
735 X=X+10bL;Y=Y+10bM;GOSUB 975
740 IF I=A P=P+1;GOTO 735
745 @(K)=P
750 NEXT M;NEXT L
755 FOR K=1TO 4
760 IF @(K)+@(9-K)>2E=1
765 NEXT K;CX=CX-6;TV=32
770 X=W
790 RETURN
800 CX=-77;CY=40
805 PRINT "GAME OVER -- 4 IN A ROW"
810 PRINT "PUSH GO";K=KP;RETURN
900 CLEAR ;INPUT "#PLAYERS?"B
905 IF B>2GOTO 900
910 CLEAR ;E=0;NT=1;BC=47;FC=90
915 BOX 0,-5,71,61,1;I=0
920 FOR X=-30TO 30STEP 10
925 FOR Y=20TO -30STEP -10
930 GOSUB 950;NEXT Y;NEXT X;RETURN
950 BOX X,Y,9,9,2
955 IF I=1BOX X,Y,7,7,1;BOX X,Y,3,3,2
960 IF I=2BOX X,Y,7,3,1;BOX X,Y,3,7,1
965 MU=(X+Y+50)bI
970 RETURN
975 IF (ABS(X)>30)+(Y<-30)+(Y>20)I=-1;RETURN
980 I=PX(X,Y)+PX(X,Y+3);RETURN
```

```
  1 .
  2 .AIRBRUSH
  3 .AND
  4 .SANDBLAST
  5 .
  6 .USE KNOB FOR SPRAY
  7 .ANT FARM (C.SCHREIER)/C*
  8 .
 10 CLEAR
 20 X=X+JX(1)
 30 Y=Y+JY(1)
 35 A=(128+KN(1))c8+1
 36 B=A
 40 BOX X+RND (A)-Ac2,Y+RND (B)-Bc2,1,1,3
 50 GOTO 20
>
```

```
   1 .
   2 .
   3 .
   4 .SPIRALS 2
   5 .BY MATT GIWER
   6 NT=0
  10 CLEAR
 100 A=3
 200 B=RND (2)
 210 C=RND (2)
 800 X=B;Y=0
 850 FOR D=1TO 100
 900 X=X+B
 905 Y=Y+C
 907 IF X>75GOTO 100
 908 IF Y>45GOTO 100
 910 GOSUB 1050
 950 NEXT D
 990 GOTO 10
1050 .M
1060 LINE X,0,A
1070 LINE 0,-Y,A
1090 LINE -X,0,A
1110 LINE 0,Y,A
1200 RETURN
9000 .M
>
```

GRAPHICS ASSEMBLER is a programming aid for those of you who want to construct shapes using the box command. Instead of using paper and pencil to figure out where you want the various boxes, this program allows you to set up a box size, move it around the screen to where you want it, and freeze it there. The coordinates of the location are now in memory, using the following instructions:

Use trigger to start system after pressing RUN/GO
Enter X and Y coordinates of box size
Enter type of box (1-4 per BOX command)
Move joystick to desired location
Press trigger to freeze box location.

It will list the command to tape at any line number you select. It will also save a number of these commands and place them all on tape with a uniform line spacing. This will take place if you command "RECORD PROGRAM". This program was developed by Hugh Fitler

```
  1 .
  2 .
  3 .GRAPHICS ASSEMBLER
  4 .BY HUGH FITLER
  5 :RETURN
  6 NT=0
 10 N=0;X=0;Y=0
 20 IF TR(1) GOTO 100
 30 GOTO 20
100 CLEAR ;IF N>0GOSUB 700
105 PRINT "SIZE?
110 INPUT "X"A;IF A<1GOTO 110
120 INPUT "Y"B;IF B<1GOTO 120
130 INPUT "TYPE?"T;IF (T<1)-(T>4)GOTO 130
140 E=3
150 CY=40;GOSUB 600;PRINT " TO SAVE  BOX
155 PRINT "PRESS - KEY TO REJECT BOX
157 GOSUB 900
158 IF N>0GOSUB 700
160 X=X+JX(1);Y=Y+JY(1)
170 BOX X,Y,A,B,E;BOX X,Y,A,B,3
180 IF TR(1)E=T;GOSUB 800;GOTO 400
185 IF &(20)=4IF N=0GOTO 100
187 IF &(20)=4GOTO 460
190 GOTO 160
200 CLEAR ;CY=40;INPUT "1ST LINE #?"C
210 INPUT "LINE SPACING?"F
220 PRINT "TURN RECORDER ON AND";GOSUB 600
230 PRINT ;PRINT
240 IF TR(1):PRINT ;GOTO 260
250 GOTO 240
260 FOR M=0TO N-1
270 PRINT #2,C," BOX ",
300 FOR P=0TO 400STEP 100
310 PRINT #1,@(M+P),;IF P<400PRINT ",",
320 NEXT P
340 PRINT
345 C=C+F
350 NEXT M
355 :RETURN ;NT=0
360 PRINT
365 PRINT "TURN RECORDER OFF AND";GOSUB 600
370 IF TR(1)CLEAR ;GOTO 100
375 GOTO 370
400 @(N)=X
410 @(N+100)=Y
420 @(N+200)=A
430 @(N+300)=B
440 @(N+400)=T
450 N=N+1
460 GOSUB 850
470 PRINT "?";K=KP
480 IF (K<"1")-(K>"2")GOTO 460
490 GOTO (K-48)b100
600 PRINT "SQUEEZE TRIGGER",;RETURN
700 FOR M=0TO N-1
710 BOX @(M),@(M+100),@(M+200),
    @(M+300),@(M+400)
715 NEXT M
720 RETURN
800 BOX X,Y,A,B,T;RETURN
850 CY=40;PRINT "ADD A NEW BOX ....1
860 PRINT "RECORD PROGRAM....2
865 GOSUB 900
867 GOSUB 700
870 RETURN
900 BOX 0,CY,159,10,2
910 BOX -55,-10,50,60,2
950 RETURN
```

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MORE ADD-ONS are in process to expand the utility of the Bally machine. All these items will use the capabilities of the Blue Ram to one extent or another. These add-ons will be available in the form of kits, as well as completed equipment, and take the form of adapters, to be plugged into the socket on the top of the Blue Ram. The kits will include the supporting programs and documentation. The first kit will be for the full size keyboard addition, and will be available on October 17.

KEYBOARD ADDITION: This kit at $24.95 provides the hardware and software needed to attach a JAMECO 610 Unencoded Keyboard to the Blue Ram. The JAMECO address is 1355 Shoreway Road, Belmont CA,94002, and the current price is $34.95. Should you desire a wired and tested combination, the package price is $89.95. Please order the keyboard direct from JAMECO-it just saves the double shipping,etc., and we don't have to inventory them. When the package is attached to the Bally via the Blue Ram, with its 36" cable, you will have:

- o Full 96 character ASCII codes, including control characters
- o Special Words Keys
- o Modem compatible functions
- o Compatibility with the new Extended Basic
- o Complete support program and documentation
- o An attractive partial enclosure
- o Maintenance of the Tape Cassette Interface

FUTURE ADDITIONS:

o The next kit will be the home control module that will use the common BSR "X-10" system. Be sure to purchase the command module that contains the ultrasonic receiver since the mode of operation of the Blue Ram module will be to send the proper ultrasonic signal to the BSR unit, which will then act as though you made a manual input. This would be a great utilization for a salvage board, as you could program the Blue Ram through your regular machine and its Tiny BASIC, then transfer the Blue Ram to the salvage board (maintaining power on, of course), and the salvage board would then perform the programmed operations.

o Then we will provide the software necessary to have the Blue Ram act as a compiler for music programs. Using Processor Technology format, one can simply enter musical selections and the software will convert that into the proper language that the Bally can understand.

o After that, we will produce the modem addition, to allow two-way telephone communication, using a commercially available modem device. Again, the addition will provide the intelligence to make the Bally and modem operate together. The Cassette Interface will be operable with this addition, to allow material to be taped on and off the telephone line.

As each of the above gets closer to production, we will report more fully. The schedule now has the control module available in mid-November, the compiler program in December. The Extended Basic cartridge is essentially complete and should be available by the end of the year.

BLUE RAM PRICE CHANGE has become necessary because of unexpected costs which have been steadily mounting. Effective IMMEDIATELY, the $60 and $70 kits are discontinued. The full $130 kit and the wired $170 kit will be subject to a $10 increase each after October 15, 1980. We regret having to take this measure but it is necessary if we are to continue our broad support.

HYBRID PROGRAMS TUTORIAL. Hybrid programs are those wich contain both machine-code program segments and BASIC program segments. The BLUE RAM UTILITY, the BLUE RAM DIAGNOSTIC, and the resistance measuring program from the last issue are three examples of hybrid programs. Transfer to the machine-code segment is via a CALL nnnnn statement in BASIC where nnnnn is the location of the machine-code routine being referenced. Transfer back to BASIC is via a C9 return instruction in the machine-code program. The advantage of using machine-code program routines is that they run several orders of magnitude faster and can easily perform logical type operations such as ANDing and ORing. It is, however, very important to remember several NO-NO's in conjunction with hybrid programs written under the current Bally BASIC:

1. Machine-code programs must not write into RAM areas occupied by the BASIC program. This means that many of the powerful built-in routines for graphics cannot be used without some care since the BASIC program is written in screen memory.

2. The DE register pair of the Z80 is used by BASIC to keep track of where it is in the BASIC program. The machine-code program must return it to BASIC with the original value if the BASIC program is to resume beyond the CALL to the machine-code program.

3. "Background" processes, running machine-code programs must also call 20B0 in order to provide BASIC with its background processing.

The last rules will be more meaningful as we proceed.

DUMPING AND LOADING HYBRID PROGRAMS is quite simple using the BLUE RAM UTILITY. The utility contains facilities for entering and dumping the machine-code portion. Bally BASIC is used in the normal way to dump the the BASIC portion. Here is a step-by-step procedure:

1. Connect the BLUE RAM, insert the BASIC cartridge, and press RESET. Both BLUE RAM switches should be up.

2. With the BLUE RAM UTILITY tape in the player and rewound, enter: :INPUT GO. This step will load the BLUE RAM UTILITY. Note that there seems to be a pause after a the first statement. Since the first statement does not have a line number it is executed immediately upon receipt. The effect of this statement is to continue to load data from the tape and place them in the BLUE RAM memory. They are not printed and therefore nothing is seen as they are

loaded. The &(192)=0 in the statement places the BLUE RAM memory in the RAM mode so that it can be written into. The &(64)=0 at the end of the machine-code segment load switches the mode back to ROM. It is important to remember that just loaded memory is left in the ROM mode and cannot be written into further without switching it back to RAM either manually or by program statement. The load is complete when the screen is cleared except for "BLUE RAM UTILITY   6000" at the top. Stop the tape at this point.

3. Once the BLUE RAM UTILITY is loaded it can be used to enter a new machine-code program or modify an existing one (already in BLUE RAM memory). Note that the utility switches the memory mode to RAM and back to ROM when changing memory contents so it is unneccessary for you to ensure that memory is in the RAM mode.

4. The machine-code segment of a hybrid program should normally be written to tape first since most changes to a program are absorbed by the BASIC segment. To dump the machine-code segment, enter: PRINT followed by the beginning and ending addresses of the segment (in hexadecimal format), followed by the letter L to indicate to the loader that another segment (the BASIC segment) follows this one. The utility will instruct you to start the tape RECORDING and press GO when it has started moving and is past the leader, if any. The utility now proceeds to write the loader on the tape followed by the data. Since the data is machine-code and not ASCII characters, most of the data will show up on the screen as question marks and words with no context. This is the data that you don't see load when the machine-code segment is being loaded. When "END OF DUMP" is seen on the screen, stop the tape but do not rewind it.

5. Press RESET to clear the utility program from BASIC memory. You are now ready to enter and dump the BASIC segment in the normal manner using the :PRINT ;LIST functions of BASIC.

A few additional notes concerning the utility: The machine-code segment for the utility is at addresses 6C00 through 6CA3. The addresses for the machine-code segment of the diagnostic are 7000 through 707E. Use these numbers in conjunction with the utility to dump extra copies of the utility and diagnostic. Also, by deleting the comment lines from the BASIC segment of the utility (lines 1 through 7), the program will run a little faster. Extra characters in a BASIC program nearly always make it run slower.

HYBRID PROGRAM DATA TRANSFER is accomplished via the letter variables A through Z. The BASIC program can place parameter data into the variables prior to CALLing the machine-code routine. Likewise, the machine-code routine can return data to the BASIC program via the same variables. The letter variables begin at address 4E6E for A and continue by two for each succeeding letter (4E70 for B, 4E72 for C, etc.) Hexadecimal digits have 16 possible values remember: 0123456789ABCDEF so that the difference between 4E6E and 4E70 is 2. Full word Z80 register pairs should be used to access these variables since BASIC treats them as full word integers. Consider the following example:

```
          6000 21 6E 4E 6E 26 00 22
          6007 70 4E C9

          10 A=28672;CALL 24576;PRINT B
```

The BASIC program sets up an input address in variable A and calls the machine-code program (24576=6000 Hex). The machine-code program reads a byte from the memory location given to it in A and returns the value of that byte in B where the BASIC program can access it to print it. For those not familiar with machine-code programming, many excellent texts are available in self-teaching and cookbook style. Also, as people contribute useful machine-code routines, their practical use will be described and they will be added to a library of such routines. It is, therefore, not neccessary to understand how a machine-code routine works in order to use it in a hybrid program. You only have to know what it does and how to call it.

<u>BACKGROUND / FOREGROUND TUTORIAL.</u> One of the best uses of a machine-code routine in a hybrid program is as a background processor. The virtual effect is to split the Z80 processor into two distinct processors: a foreground processor and a background processor. So complete is this virtual split that the resultant two processors can talk to each other as if they really were two separate Z80's. Like a bi-cameral mind, each half goes about its assigned duties totally oblivious to the other's status. The foreground processor is responsible for the primary logic of the overall program, gathering inputs and initiating new processes, usually without regard for timing effects. The background processor is triggered by an external event and responds usually with fixed logic and parameters supplied to it by the foreground processor. The most common event trigger in the Bally Arcade is the screen interrupt which occurs 60 times a second. A background process tied to this stimulus will receive control at this 1/60th of a second interval allowing it to perform repetitive operations at that rate. BASIC uses such a background process to implement the note timer NT for the duration of the tone associated with a printed character. The foreground processor prints the character on the screen and then sets the value of the note timer in a special memory location for the background processor. After it prints the second character, it checks the special location for a zero value. If the value is not zero it continues to wait and check. If it is zero, it places the new NT value in that location and continues to print the next character. The background processor, operating at the 60x rate decrements the special location. Therefore, a value of NT=3 equates to a note time delay during printing of 3/60ths of a second. The background process handles the

chore of time keeping while the foreground process is free to continue executing the main program. The most significant use of a background process tied to the screen interrupt is animation. The trick of providing smooth animation, like any magic trick, is to perform the manipulation while no one is looking. Because of the scanning of your TV picture, a period exists between "frames" where the sweep is returned to the top of the screen; a period known as vertical retrace. During this time, no information is being written to the screen. What you are seeing during this time is not screen memory but the fading image of what was in screen memory during the preceeding 60th of a second. It is during this time, therefore, that no one is "looking" at screen memory. By asking for the screen interrupt to occur at the end of the scan, about three milliseconds are available to change screen memory before it starts being displayed again. If changes are made during this time, they will appear as smooth transitions as opposed to the regged-edged motion we often see when trying to attempt high-speed animation with the foreground BASIC program. The background processor gives you both screen synchronization and high speed data manipulation required for smooth, fast animation. This is the same technique used in the animation of the various game cartridges and now the BLUE RAM offers you this same method. The following tutorial describes a sample background program.

<u>FAST ACTION GRAPHICS</u> is demonstrated in this machine code background routine. Enter this program using your BLUE RAM UTILITY and watch the graphic bounce around the screen without disturbing what is there! The speed of motion is controlled by the #1 knob. Another special effect produced by this routine is a "curtain of invisibility" at the top of the screen. As the graphic moves behind the curtain, it disappears one-half pixel at a time. The size of the curtain is also controlled by the #1 knob. Notice that you can still enter programs, etc. in BASIC because the graphic movement is performed in the background mode where it does not tie up the processor.

```
6000 F3 D9 3E 60 ED 47 3E
6007 18 D3 0D 21 6A 60 11
600E 00 70 01 0D 00 ED B0
6015 D9 FB C9 1A 60 CD B0
601C 20 ED 73 7E 70 31 7E
6023 70 F5 C5 D5 E5 DD E5
602A FD E5 DB 1C 32 02 70
6031 FF 00 07 4C 60 3F 00
6038 70 52 60 07 4C 60 02
603F FD E1 DD E1 E1 D1 C1
6046 F1 ED 7B 7E 70 C9 1F
604D 00 70 56 60 08 00 98
6054 00 50 00 00 02 08 28
605B 00 82 00 82 00 A8 2A
6062 80 80 80 A8 00 80 00
6069 2A 20 80 00 05 00 00
6070 00 03 05 00 00 00 03
```

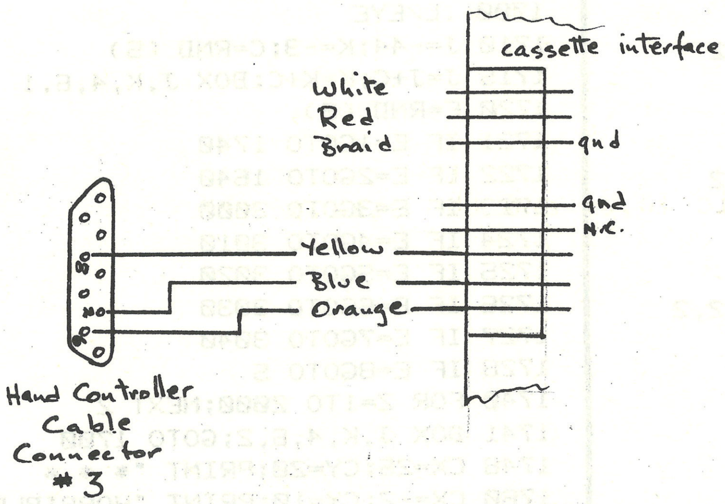
Location 6000 disables the current background process. 6001 through 6009 reassign background processing to a routine whose beginning address is can be found in the word at location 6018. 600A through 6014 move a motion control table into the 7000 area so that this routine can operate in the ROM mode if desired. 6015 & 6016 reenable the background processor. 6017 returns to the foreground program from which it was called. Loactions 601A through 601C envoke the original BASIC background processor. This is necessary so that the note timer can be decremented as required when printing characters. Otherwise, the foreground program would hang up waiting for the timer to clear and not be able to continue with the foreground program. 601D through 602B save all of the Z80 registers so that their original values can be returned to the foreground program. 602C through 6030 read the #1 controller knob and place the value in the motion control table as the current motion velocity multiplier. 6031 through 603E and 604C through 6051 invoke special graphics and animation services built into the Bally Arcade internal ROM. These will be discussed in later issues. 603F through 604B restore the Z80 registers to their original values and return to the forground program in progress. 6052 through 6055 define the boundries of the graphic motion (152 wide and 40 high). 6056 through 6059 define the coordinate reference of the graphic (0,0) and the size of the graphic (8x8 pixels). 605A through 6069 is the image of the graphic itself. Note that only odd bits are used. This is very important when working with this BASIC since even bits store the actual BASIC program statements. If these even bits are disturbed, the BASIC program will be altered, usually catastrophically. The remainder of the program, 606A through 6077 define the constants for the motion control table. These values define 5/256ths of a pixel times the current velocity multiplier worth of motion in both the X and Y coordinates with each update (60 times per second). The fastest speed, therefore, is 5 pixels x 60 updates = 300 pixels per second. The "3's" in the table indicate that the graphid is to bounce off the sides instead of stopping.

To stop the background process from the foreground process using BASIC, enter: :RETURN;GO. To start it up again, enter: CALL 24576;GO

ADDITIONAL BASIC FEATURES are still being found. The :INPUT and :LIST operations can be followed by an identifier for loading or listing a particular program from a tape that contains several programs. When dumping these programs to tape the identifier must be placed on the tape as follows: :PRINT ;TV=n;TV=m;LIST ... where (m)x256+(n) is the identifier. To have BASIC automatically find that identifier on tape, use: :INPUT (i) where i is the same identifier. Example: :PRINT ;TV=3;TV=2;LIST :INPUT 515 or :LIST 515.

UNLUCKY 8000 is a hex decimal value that BASIC cannot perform arithemetic on. It is equivalent in decimal value to -32768, outside BASIC's legal range. This only presents a problem when the 8000 value is required in a machine-code program as it is at locations 6066 and 6067 in the moving graphic program. Attempts to generate this number will work. It is during the read process that a HOW? error is produced. There is no known work-around for this problem except to avoid reading such a word. As was stated, you can generate it, write it to tape, and even re-read it from tape without problem. But you cannot list it or readit individually using the utility.

CASSETTE INTERFACE CABLE The schematic is shown for the cable that goes between the interface and the Bally itself, for those of you who have had problems in that area:

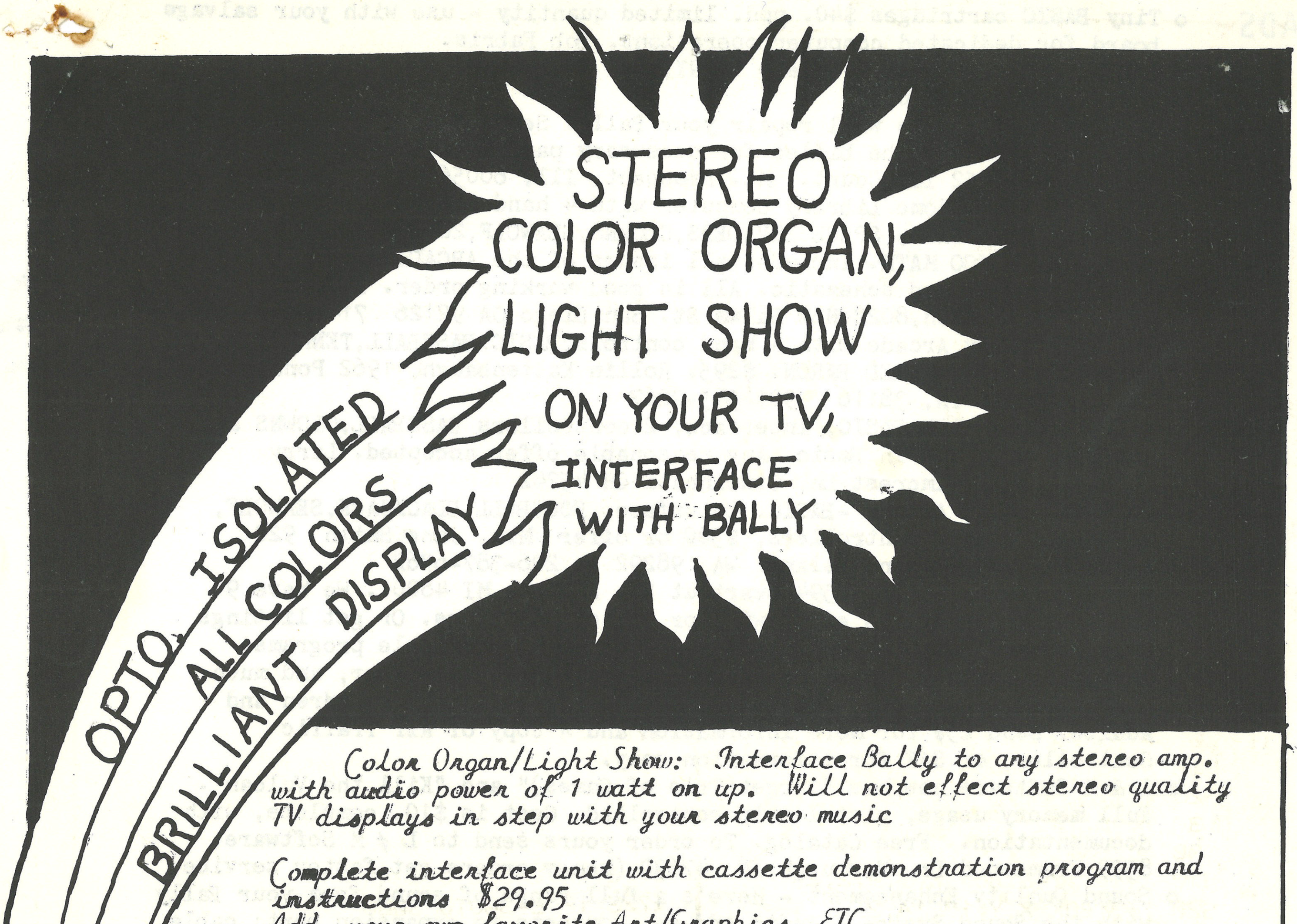


HALLOWEEN GHOST is a self-running program that is topical. The author sets up a TV at a window near his front door, and the program, a "talking" skull, makes snide remarks about the people going by. It re-cycles, and uses random statements on the screen, shifting colors as well.

```
   1 .
   2 .
   3 .
   4 .HALLOWEEN GHOST
   5 .BY J.WILKINSON
   8 :RETURN
   9 FOR Z=1TO 3000;NEXT Z
  10 CLEAR ;BC=RND (256)-1
  20 FC=BC+4+RND (32)b8;GOSUB 1748
  50 X=-32;Y=18;BOX X,Y,30,2,3
 110 Y=16;BOX X,Y,34,2,3
 130 Y=14;BOX X,Y,38,2,3
 150 Y=12;BOX X,Y,42,2,3
 170 Y=10;BOX X,Y,46,2,3
 190 Y=0;BOX X,Y,50,17,3
 210 Y=-10;BOX X,Y,46,3,3
 230 Y=-13;BOX X,Y,42,3,3
 250 Y=-16;BOX X,Y,38,3,3
 270 Y=-22;BOX X,Y,34,10,3
 290 Y=-28;BOX X,Y,30,1,3
 310 Y=-29;BOX X,Y,26,1,3
 330 Y=-30;BOX X,Y,22,1,3
 350 Y=-31;BOX X,Y,18,1,3
 500 .R/SKT
 510 X=-23;Y=8;BOX X,Y,3,2,2
 520 Y=0;BOX X,Y,10,14,2
 530 Y=-8;BOX X,Y,4,2,2
 800 .L/SKT
 810 X=-41;Y=8;BOX X,Y,4,2,2
 820 Y=0;BOX X,Y,10,14,2
 830 Y=-8;BOX X,Y,3,2,2
1200 .NOSE
1220 X=-32;Y=-10;BOX X,Y,2,2,2
1240 Y=-11;BOX X,Y,4,2,2
1260 Y=-12;BOX X,Y,8,2,2
1280 Y=-13;BOX X,Y,6,2,2
1300 Y=-14;BOX X,Y,10,2,2
1320 Y=-16;BOX X,Y,6,1,2
```

```
1400 .MOUTH
1420 X=-32;Y=-24;BOX X,Y,10,2,2
1440 X=-26;Y=-22;BOX X,Y,2,2,2
1460 X=-24;Y=-20;BOX X,Y,2,2,2
1510 X=-38;Y=-22;BOX X,Y,2,2,2
1530 X=-40;Y=-20;BOX X,Y,2,2,2
1600 .R/EYE
1610 X=-26;Y=-4;A=RND (5)
1615 X=X+A;Y=Y+A;BOX X,Y,4,6,1
1620 B=RND (8)
1621 IF B=1GOTO 1640
1622 IF B=2GOTO 1740
1623 IF B=3GOTO 2000
1624 IF B=4GOTO 2010
1625 IF B=5GOTO 2020
1626 IF B=6GOTO 2030
1627 IF B=7GOTO 1740
1628 IF B=8GOTO 5
1640 FOR Z=1TO 2000;NEXT Z
1641 BOX X,Y,4,6,2;GOTO 1600
1700 .L/EYE
1710 J=-44;K=-3;C=RND (5)
1715 J=J+C;K=K+C;BOX J,K,4,6,1
1720 E=RND (8)
1721 IF E=1GOTO 1740
1722 IF E=2GOTO 1640
1723 IF E=3GOTO 3000
1724 IF E=4GOTO 3010
1725 IF E=5GOTO 3020
1726 IF E=6GOTO 3030
1727 IF E=7GOTO 3040
1728 IF E=8GOTO 5
1740 FOR Z=1TO 2000;NEXT Z
1741 BOX J,K,4,6,2;GOTO 1700
1748 CX=25;CY=20;PRINT "* * *
1760 CX=-2;CY=10;PRINT "HORRIBLE HARRY
```

```
1780 CX=0;CY=0;PRINT "THE INSULTING
1800 CX=17;CY=-10;PRINT "TV GHOST
1820 CX=6;CY=-20;PRINT "MYSTERIOUSLY
1840 CX=22;CY=-30;PRINT "APPEARS
1860 CX=-62;PRINT "--HERE EVERY HALLOWEEN--";FOR Z=1TO 1500;NEXT Z;RETURN
2000 CY=32;PRINT "  WHAT IS YOUR PROBLEM?--";GOTO 1740
2010 CY=32;PRINT "  YOU LOOK TERRIBLE!!!---";GOTO 1740
2020 CY=32;PRINT " THAT CAN'T BE -YOUR FACE-";GOTO 1740
2030 CY=32;PRINT " YIPES!!-YOU SURE ARE UGLY";GOTO 1740
3000 CY=32;PRINT "  YOUR WORMS ARE SHOWING-";GOTO 1640
3010 CY=32;PRINT "  ... WHO DUG YOU UP? ...";GOTO 1640
3020 CY=32;PRINT " HOW COME YOU HAVE 3 EYES?
3021 X=-32;Y=12;BOX X,Y,7,9,2;BOX X,Y,10,3,2;BOX X,Y,3,4,1;GOTO 5
3030 CY=32;PRINT " YOU LOOK LIKE THE -DEVIL-";GOTO 1640
3040 CY=32;PRINT " I'D HATE TO BE YOUR MUMMY";GOTO 1640
>
```



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- o STARTEK Electronics will repair your Bally. Send printed circuit board and $25 - you will be billed for necessary parts. (i.e., cost is $25 plus parts) 552 Ida Court. Mt. Prospect, Ill, 60056
- o FOR SALE Bally Home Library Computer with 4 hand controllers, BASIC, Cassette Interface, SPACE INVADERS,CLOWNS,SEAWOLF,280 ZAP,STAR BATTLE, BASEBALL, BINGO MATH. Includes all issues of the ARCADIAN and the PA-1 service Manual and schematic. All in good working order. Sacrifice at @235. Bob Whitton,8022 New Salwm St. San Diego CA 92126 714-566-3759
- o FOR SALE Bally Arcade with 4 hand controls,BASIC,BASEBALL,TENNIS,HOCKEY, HANDBALL, 280 ZAP,RED BARON. $295. Rollin Kaltenbaugh, 1962 Ponderosa Ave., Memphis TN, 38116 901-345-2267
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- o L & M Software now has "Target(Trio of Games)" and "Kill the Vulcan". Full memory usage, pistol grip controlled. Cost is $10. complete, with documentation. Free Catalog. To order yours send to L ¢ M Software, 8599 Framewood Dr. Newburgh IN 47630 (money orders get faster service)
- o Sound Quality Enhancement - Here's a full range of sound from your Bally with the Sound System I Audio Add-on. Connects to expansion port; cable and connector included. Features 4-8 ohm speaker output, 2 pre-amp outputs, headphone jack, on/off-volume control, and 117v operation. Only $28. wired and tested. Identify if you have a Blue Ram.
  Heavy duty power controller to replace Bally wall transformer. All steel cabinet construction with on/off switch and indicator light plus an easy-to-replace fuse output. Line cord, Bally power connector, $24.
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  (above items available late September)
- o WANTED Used or rejected BALLY Enrike, apartado 219, Chetumal, QROO MEXICO
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